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### Reel consisting of a Metal Strip with Loops

The invention pertains to the reel of a formed metal strip with regular loops, in particular to a clip reel for packaging equipment. The metal strip must coil around at least three times and its free end must extend into the direction of unwinding. A releasable retaining device connects two points of the metal strip, with one point close to the free end and the second point at another turn of the coil or – if available – at a spool, thus preventing reel unwinding. The invention also pertains to a retaining device for a reel consisting of a metal strip with loops, in particular to a clip reel for packaging machines. The metal strip must coil around at least three times and its free end must extend into the direction of unwinding.

A commonly used metal strip reel consists of a continuous row of clips like they are used to seal sausage ends. Adhesive tape is affixed to the free end of this clip reel and the adjacent coils (or a spool, if applicable), thus preventing the unintentional unwinding of the clip reel. Removing this tape is often tedious and eventually residual sticky tape may cause the packaging equipment to malfunction.

As its objectives, the submitted invention proposes a reel, which does not unwind unintentionally, and a retaining device, both allowing a convenient insertion into the packaging machine. The invention meets these objectives for a reel of the above-described nature through a shape-mated connection. As a result, inserting a reel into the packaging equipment requires no more effort than separating the retaining device from the free end. The reel no longer needs to be cleansed of adhesive tape. Unlike adhesive tape, the retaining device practically never unfastens unintentionally. Once placed correctly on the reel, there is no need to check again whether the reel is firmly secured against unwinding.

The shape-mated connection between the retaining device and the metal strip allows it to exert a relatively large force on a small area. While reels according to today's best available technology require relatively long adhesive tapes with powerful adhesives, the reel according to this invention requires only a small contact point. Accordingly, the retaining device needs to have only small dimensions.

In case the shape-mated connection is placed between the free end of the metal strip and a coil core (spool), the invention-based reel does not even require additional parts and consequently, waste disposal is also redundant. To manufacture the retaining device and the spool independently and to facilitate reel insertion, the preferred retaining device is a separate part with two spatially separated ends.

A shape-mated connection between the free end of the clip reel and the retaining device is best established using a retaining device with a lug ring terminal on the first end and with a hook on the second end. The free end of the clip reel is threaded through the lug ring so that it catches inside one of the loops. The hook grips one of the metal strip loops. To create a shape-mated connection between the retaining device and the metal strip the free end is threaded through the lug ring up to the first loop so that the lug ring reaches through the loop. The hook is then locked in place grasping the loop of another coil, thus creating a secure connection between the free end and the retaining device.

The hook of first choice is a carabiner (snap hook). This hook guards against mechanical release due to accidental coil movement, e.g. during transport. Snapping this hook to a loop is easily done.

The entire retaining device is preferentially made of synthetic material. This allows the fast and cost-effective production of such retaining devices. Casting the retaining device in one piece is the production method of choice.

According to a second aspect, the invention is realized as a retaining device, which consists of a flat shaft with a lug ring on one end and a hook on the opposite end.

In its preferred embodiment, the retaining device features a first end with a lug ring, which connects to the free end of the metal strip. The other end of the retaining device can then be affixed to a loop in another coil.

The drawings below describe the invention in detail:

Figure 1 A perspective schematic diagram of a coil on a spool in side view.

Figure 2 Perspective view of a coil segment on a spool.

Figure 3 Retaining device in top view.

Figure 4 Coil on a spool in top view.

Figure 1 shows a coil 10, which consists of a metal strip 12 with a series of uprising loops 14a, 14b, 14c. In the embodiment example shown here, the metal strip 12 is shaped into loop structures 14 above the coil base. Splitting the metal strip 12 between adjacent loops creates the clips for the packaging equipment. The base for the metal coil is a spool 18 with only a single turn. The free end of the metal strip extends into the direction of unwinding. Without a retaining device the free end 16 would move away from the spool as indicated by the arrow P.

Figure 2 offers a perspective view of a coil segment 10 on the spool 18 with three coils. Close to the end of the metal strip, the lug ring 20 of the retaining device 22 reaches through the metal strip loop over the coil base. The lug ring 20 is located close to the loop 14a and locks into the loop in a shape-mated connection.

A flat shaft 24 links the lug ring 20 and the hook 26. The hook is executed as carabiner and latches into loop 14b in a shape-mated connection. The catch 28 is part of the carabiner hook and ensures that the retaining device 22 does not disconnect from the